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EXAMINER

BHATNAGAR, ANAND P

ART UNIT PAPER NUMBER

2623

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/034,066

Applicant(s)

AKGUL ET AL.

Examiner

Anand Bhatnagar

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-17, 19-24 and 26-30 is/are rejected.
- 7) ☒ Claim(s) 10, 18 and 25 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12/28/01 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 06/24/02.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. A.) The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 28 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for limiting the size of the Fourier transformed input image to the powers of two, does not reasonably provide enablement for limiting the digital data to a square data set that are multiples of powers of two. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to put in practice the invention commensurate in scope with these claims. The data has not undergone the process of being Fourier transformed and limited to the powers of two, only that the image has been limited as a square that are multiples of powers of two.

- B.) The following is a quotation of the second paragraph of 35 U.S.C. 112:

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1: Applicant has a set of at least one or more oriented filters and has them oriented at incremented angles between each of said filters but if the set of filters only contains one filter then how is this possible. This claim is indefinite since if there is only one filter there can be no incremented angle between filters. Also a set is usually more than one item not just a single item. Appropriate correction is required. Examiner will address these claims as best understood.

Regarding claims 12 and 19: A set of oriented filter is applied to an image to obtain a set of filtered images. Examiner is unsure how a single filter applied to a single image results in a set of filtered images. Is the filter applied several times to the same image? Also a set is usually more than one item not just a single item. Also a combined image is formed from a set of filtered image. How does one generate a combined image from a single image? Appropriate correction is required. Examiner will address these claims as best understood.

Claims 12 and 19 recite the limitation "said set of oriented filters" and "set of filtered image". There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 4, 7-9, 12, 13, 15, 19, 20, 22, and 27-30 are rejected under 35

U.S.C. 102(e) as being anticipated by Kumar et al. (U.S. patent 6,753,965).

Regarding claims 1, 12, and 19: Kumar discloses a method of detecting defects in an object (col. 1 lines 15-18) comprising the steps of:

acquiring a digital image of said object (fig. 7 element 700 and col. 9 lines 45-48);

applying a set of one or more oriented filters to said digital image to generate a corresponding set of filtered data, wherein said set of oriented filters comprise two dimensional oriented spatial bandpass filters having incremented angles of orientation between each of said filters (fig. 7 element 710, col. 5 lines 7-18 and 38-67, col. 6 lines 1-12, and col. 9 lines 52-55, wherein 16 Gabor filters are applied to the image at different orientations. These filters are two dimensional spatial bandpass filters); and

combining said set of filtered data to form a combined data set representing defect features (fig. 7 element 740, col. 2 lines 48-53, col. 9 line 67 and col. 10 lines 1-4).

Regarding claims 2, 13, and 20: The method wherein said filters are Gabor filters (fig. 7 element 710).

Regarding claims 4, 15, and 22: The method wherein filter parameters are selected to identify scratches having predetermined width range (col. 6 lines 58-62, wherein the Gabor filters can be tuned/selected to discriminate the local defects, i.e inherently to the size/shape/ type of the defect.).

Regarding claim 7: The method according to claim 1 further comprising the step of chaining said filtered images to form a set of chained filtered images before said combining step and wherein said combining step combines said set of chained filtered images to form a combined image (fig. 7 elements 710-750, wherein the chain of filtered images are combined).

Regarding claim 8: The method wherein said incremented angles are clustered around predetermined angles of interest (col. 6 lines 5-10, wherein the filters are arranged around the predetermined angles zero deg., 45 deg., 90 deg., and 135 deg.).

Regarding claim 9. The method wherein said step of applying said Gabor filters comprises applying only a real part of said Gabor filters (col. 6 lines 7-10).

Regarding claim 27: The method further comprising a step of sub-sampling said digital image to form a sub-sampled digital image prior to said step of applying a set of one or more oriented filters (col. 5 lines 63-65, wherein the input image is sampled at different scales and orientations, i.e. the image is sub-sampled prior to the filters being applied); and

wherein said digital image to which said set of oriented filters is applied is said sub-sampled digital image (col. 5 lines 63-67 and col. 6 lines 1-4).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

A.) Claims 3, 5, 6, 11, 14, 16, 17, 21, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. (U.S. patent 6,753,965 B2).

Regarding claims 3, 14, and 21: The method wherein said set of oriented filters comprises eighteen Gabor filters having angles of orientation from approximately 0 degrees to approximately 170 degrees at approximately 10 degree increments.

Kumar et al. discloses to have sixteen Gabor filters in a chain filtering an image to discriminate defects in the image (fig. 7 element 710 and col. 9 lines 52-55). Kumar does not disclose to have eighteen Gabor filters having angles from 0 deg. to 170 deg. at 10 deg. intervals. This is a matter of design choice of how many filters at what angles to orient these filters. Further applicant does not give the advantages that eighteen filters at those angles have over any other filters and angle combinations.

Regarding claims 5, 16, and 23: The method wherein said predetermined width range is about between three and ten pixels.

Kumar et al. discloses wherein the Gabor filters can be selected/tuned to discriminate the local defects (col. 6 lines 58-62, wherein the Gabor filters can be tuned/selected to discriminate the local defects, i.e inherently to the size/shape/type of the defect.). Kumar does not disclose to have the width range from three to ten pixels. This is a matter of design choice wherein the filters can be chosen/tuned to discriminate a certain size/width/length defect.

Regarding claims 6, 17, and 24: The method wherein said parameters are further selected to ensure that angularly adjacent filters overlap.

Kumar discloses to use multiple Gabor filters at different orientations. Kumar does not teach to have the filters adjacent filters overlap. This is a matter of design choice wherein the filters can be made to overlap.

Regarding claim 11: The method wherein said object comprises an optical fiber end surface.

Kumar et al. discloses to look for defects of a fabric by applying Gabor filters to the acquired image of the fabric. Kumar et al. does not teach to look for defects in an optical fiber end surface. It would have been obvious to one skilled in the art to apply this method for a quality inspection of other products such as optical fibers.

B.) Claims 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. (U.S. patent 6,753,965 B2) and Broussard et al. (U.S. patent 6,137,898).



Regarding claim 26: The method according to claim 1 wherein said applying step for each of said one or more oriented filters further comprises the steps of:

Kumar et al. discloses to filter an image using gabor filters to locate defects in the image. Kumar et al. does not teach computing a Fourier transform of a corresponding filter kern to form a frequency domain kernel, computing the Fourier transform of said digital image to form a frequency domain image, multiplying said frequency domain kernel with said frequency domain image to form a frequency domain product, nor inverse Fourier transforming said frequency domain product to form said filtered data. Broussard et al. teaches these features wherein the subimage and the gabor filtered data are fourier transformed then these two datas are multiplied and then a inverse transform performed on this data (Broussard et al.; col. 19 lines 48-67). It would have been obvious to one skilled in the art to combine the teaching of Broussard et al. to method of Kumar et al. because they are analogous in detecting objects on an image using Fourier transform and gabor filters. One in the art would have been motivated to incorporate the teaching of Broussard et al. to that of Kumar et al. in order to remove the false positive detections (Broussard et al.; col. 2 lines 22-23).

Regarding claim 28: The method according to claim 27 wherein said sub-sampled digital image comprises a square data set having sides that are multiples of powers of two.

Kumar et al. discloses to filter an image using gabor filters to locate defects in the image. Kumar et al. does not disclose to have the image data in a square sides with the multiples of powers of two. Broussard et al. teaches to have the the data as a square with the power of two (Broussard et al.; col. 19 lines 48-67). It would have been obvious to one skilled in the art to combine the teaching of Broussard et al. to method of Kumar et al. because they are analogous in detecting objects on an image using Fourier transform and gabor filters. One in the art would have been motivated to incorporate the teaching of Broussard et al. to that of Kumar et al. in order to remove the false positive detections (Broussard et al.; col. 2 lines 22-23).

C.) Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. (U.S. patent 6,753,965 B2) and Kawahara (U.S. patent 6,014,617).

Regarding claim 29: Kumar et al. discloses to filter an image using Gabor filters to locate defects in the image. Kumar does not teach to combine said data set of filtered data comprises interpolating subsets of said set of filtered data wherein said subsets comprise filtered data responses from a plurality of oriented filters. Kawahara teaches the feature of combining data by interpolation using filtered data from adjacent channels (Kawahara; col. 6 lines 25-39). It would have been obvious to one skilled in the art to combine the teaching of Kawahara to that of Kumar because they are analogous in filtering a signal using Gabor filters.

One in the art would have been motivated to incorporate the teaching of Kawahara to that of Kumar in order to extract the precise instantaneous frequency (col. 6 lines 38-39).

Regarding claim 30: The method wherein said plurality of oriented filters are angularly adjacent oriented filters (Kumar; fig. 7 element 710, col. 5 lines 57-59, and col. 9 lines 52-55).

#### ***Allowable Subject Matter***

4. Claims 10, 18, and 25 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

#### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Palmquist et al. (U.S. patent 5,179,419) for a optical fiber defect system.

#### ***Contact Information***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anand Bhatnagar whose telephone number is

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(703) 306-5914, whose supervisor is Amelia Au whose number is 703-308-6604, group fax is 703-872-9306, and Tech center 2600 customer service office number is 703-306-0377.

AB

Anand Bhatnagar

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October 30, 2004

A large, stylized handwritten signature in black ink, likely belonging to Samir Ahmed, is written over the printed name and title.

SAMIR AHMED  
PRIMARY EXAMINER